

## MARIE

### August 2003 Status – Science Data Comments

During August 2003, the MARIE instrument provided radiation data continuously with few intermittent breaks due to data download and erase sequences. MARIE operation continues to be nominal. For the month of August, MARIE was in science mode acquiring data about 88% of the time, equivalent to 27.2 days. This is the highest percentage of time that the MARIE instrument acquired data during one month.

The average measured dose rate was  $21.6 \pm 4.3$  mrad/day. The uncertainty in the dose rate reflects the present state of our understanding of the instrument properties (geometry factor, trigger threshold, etc.) that go into the normalization factors used to convert count rate to dose rate. The science team has been working diligently to minimize these uncertainties.

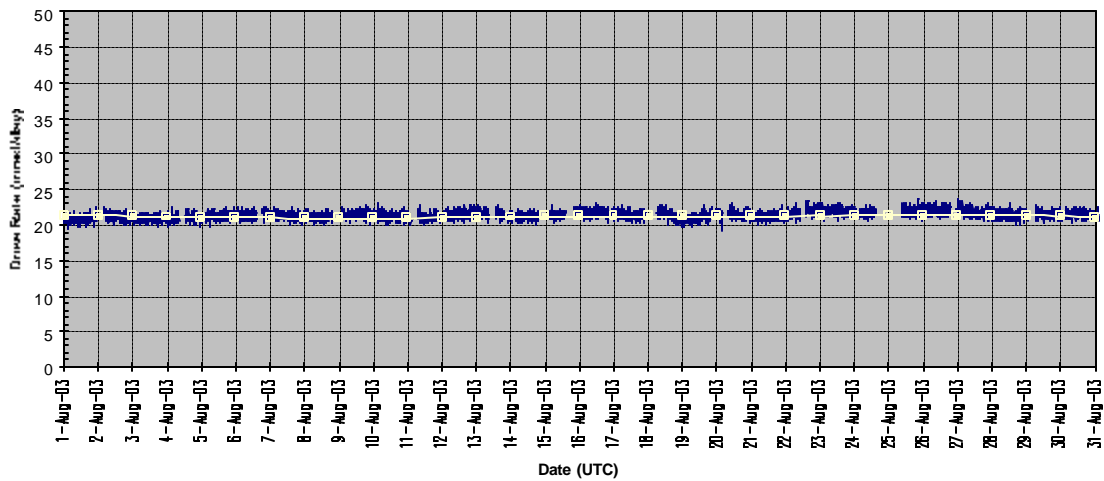
No large variations in the GCR dose rate were seen over the course of the month, and no significant Solar Particle Events (SPE) were seen in August (see Figures 1 and 2). Near-Earth detectors observed a very weak SPE on August 19<sup>th</sup>. This event was correlated with an X-ray flare observed by GOES-12, and was seen as a small flux enhancement in GOES-11 proton data in the 10-50 MeV bin. No enhancement was seen by GOES-11 at 50 MeV or above, and there was no corresponding enhancement of the count rate observed by MARIE, which has threshold energy for protons of 30 MeV. It is quite possible that the flux enhancement was confined to energies below 30 MeV, in which case MARIE would not have seen it.

For the month of August, the model prediction of quiet-time GCR was 21.2 mrad/day while the MARIE measured August month average quiet-time GCR was 21.6 mrad/day. Thus, the MARIE measurements are within 2% of the predicted model calculations, however, uncertainties in the MARIE measured data are currently estimated to be  $\pm 10\%$ .

The average Earth-Sun-Mars angle during August-2003 was about  $4.45^\circ$  with Earth at 1.01 AU and Mars at 1.38 AU.

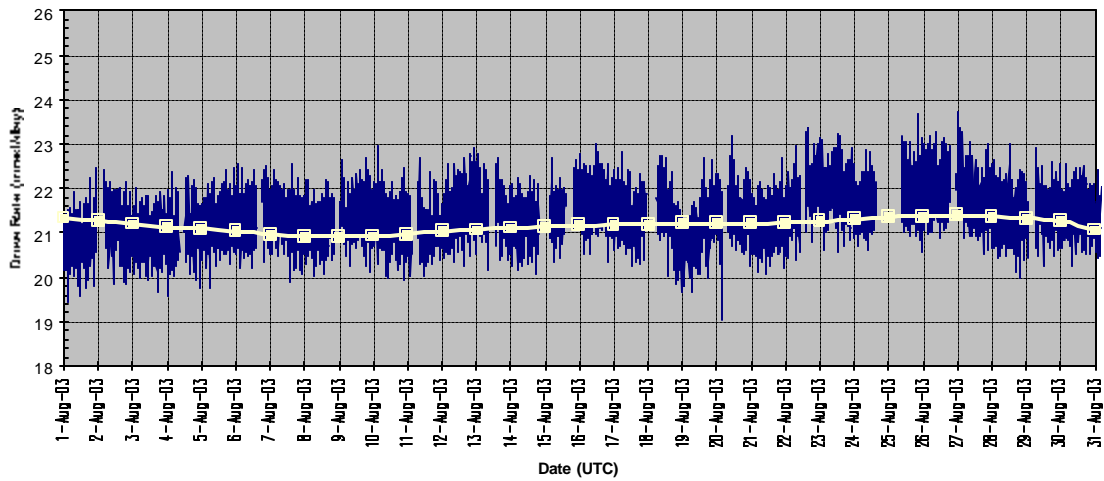
Recent dose rate measurements from MARIE are also presented (see Figure-3). These span the period from May 1, 2003 to August 31, 2003. A moderate SPE was observed from May 31 through June 3, followed by a slight decrease in GCR dose rate (a Forbush decrease) that lasted for about two days.

August 2003: Model Calculations vs. MARIE Measurements

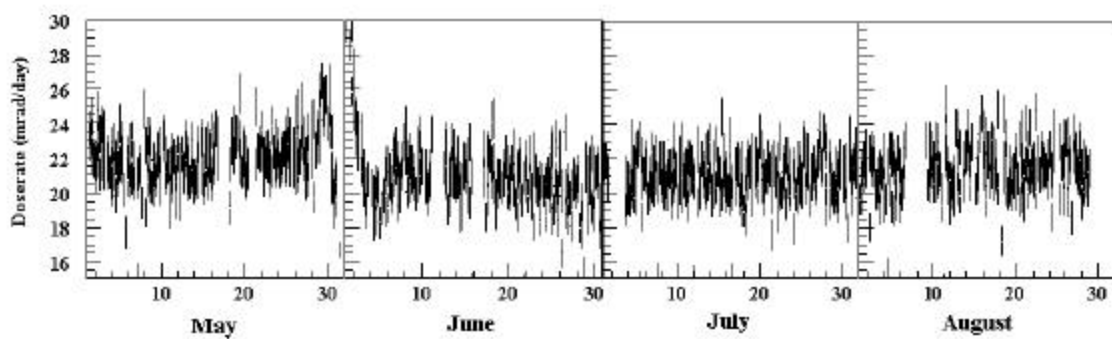


**Figure 1:** Radiation dose-rate from the CCR contribution in the Martian orbit during August 2003. Dose-rate (mrad/day) measurements from MARIE (blue discrete line) are shown along with the model predictions (yellow dotted line). The average dose-rate is within 10% of the model predictions. Also, see Figure 2.

August 2003: Model Calculations vs. MARIE Measurements



**Figure 2** (Close-up view of Figure 1): Radiation dose-rate from the GCR contribution in the Martian orbit during August 2003. Dose-rate (mrad/day) measurements from the MARIE instrument (blue discrete line) are shown along with the model predictions (yellow dotted line). Short-term GCR modulation of the MARIE measurements are in concert with the model predicted variations.



**Figure 3:** Recent dose-rate measurements from the MARIE instrument (May – August 2003). Note the SPE enhanced dose-rate during May 29<sup>th</sup> through June 3<sup>rd</sup>.